"His Master's Voice"

SERVICE MANUAL

for

FIVE-VALVE

BROADCAST BAND A.C. RADIOGRAM

TABLE MODEL 112

(Incorporating Chassis Type A536B/S R/G)

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THE GRAMOPHONE COMPANY LIMITED
(Incorporated in England)
HOMEBUSH, N.S.W.

TECHNICAL SPECIFICATION

VOLTAGE RANGE:

200 to 250 volts, 50 cycles.

NOTE: It is important that the receiver and motor be operated at the correct mains voltage as indicated on the respective voltage panels.

CONSUMPTION:

Radio Operation	37 watts.
Gramophone Operation	48 watts.

FREQUENCY RANGE:

540 to 1600 KC.

I.F. FREQUENCY:

457.5 KC.

VALVES:

6A8G	Converter	6V6GT	Power
6U7G	I.F. Amplifier	6X5GT	Rectifier
6G8G	Demod. AVC. A.F. Amplifier.		

DIAL LAMPS:

Two 6.3V. 0.15 to 0.30 amps.

LOUD SPEAKER:

6in. permagnetic, 3.7 ohm voice coil impedance at 400 cycles.

PICK-UP:

H.M.V. Type 25, D.C. Resistance 7,400 ohms.

DIMENSIONS:

Length, 20in. Depth, 15in. Height, 13½in.

WEIGHT:

Net, 39 lbs. Gross, 65 lbs.

CIRCUIT DESCRIPTION

This model is a 5-valve, mains-operated super-heterodyne receiver for the broadcast band and record reproduction.

FREQUENCY CHANGER

The aerial is coupled to the signal frequency circuit by means of the iron dust cored aerial transformer L1 and L2.

A pentagrid valve, V1 is employed as frequency changer. The oscillator circuit has a fixed padding capacitor, C8. The padding adjustment is achieved by means of variable iron-dust-core slug in the oscillator coil L3. Oscillator voltage on the signal grid of the converter is neutralised by means of a small wire capacitor connected from the oscillator anode grid to the signal grid.

I.F. AMPLIFIER

The converter valve is transformer-coupled to a super control pentode, V2. This valve is in turn transformer coupled to one diode section of a duo-diode pentode, V3. Both I.F. transformers IFT1 and IFT2, are permeability tuned and have fixed tuning capacitors.

AVC-DEMOD.-A.F. AMPLIFIER

The AVC potential for the converter and I.F. amplifier valves, V1 and V2, is obtained from the remaining diode of V3, which is capacity-coupled to the primary of the second I.F. transformer, IFT2. The action of this diode is delayed by the potential across the cathode resistor R11.

The demodulated signal across the diode load R10, is applied to the grid of the pentode section of V3, through the volume control VR1. The audio amplifier is resistance-capacity coupled to the grid of the beam power valve V4.

A "Gram-Radio" Switch, S1, is provided. This 2-pole, 2-position switch disconnects, in the "Gram" position, the screen voltage from the converter and I.F. amplifier valves, V1 and V2, and switches the audio section from the demodulator circuit to the pick-up.

For record reproduction a continuously variable tone control is provided. It consists of the condenser C6, resistor R22, and variable Resistor VR2, connected in series across the pick-up terminals.

OUTPUT STAGE

Negative feedback voltage is taken from the secondary of the output transformer T2 and fed into the tap of the volume control VR1 through a resistor. This arrangement provides negative feedback over the whole of the audio frequency system. By advancing the volume control setting for higher gain, the feedback factor is reduced.

H.T. SUPPLY

The power supply employs an indirectly heated type high vacuum rectifier V5. The filter circuit consists of two 16 mF. electrolytics, C27 and C28, and the filter choke, CK1.

The speaker transformer and filter choke are mounted on the speaker frame.

DISMANTLING

NOTE: A Service hatch is provided in the bottom of the cabinet to give access to the internal parts of the receiver chassis.

REMOVAL OF CHASSIS

1. Disconnect power plug from supply mains.
2. Remove back of cabinet by unscrewing the wood screws fastening it, and disconnect the aerial and earth leads from the chassis terminals.
3. Disconnect loud speaker and pick-up plugs.
4. Disconnect receiver mains supply leads at the 2-way connector.
5. Remove knobs.
6. Remove four holding screws underneath cabinet.
7. Remove chassis from cabinet by turning it slightly so that it will slide out between the motor and the cabinet wall.

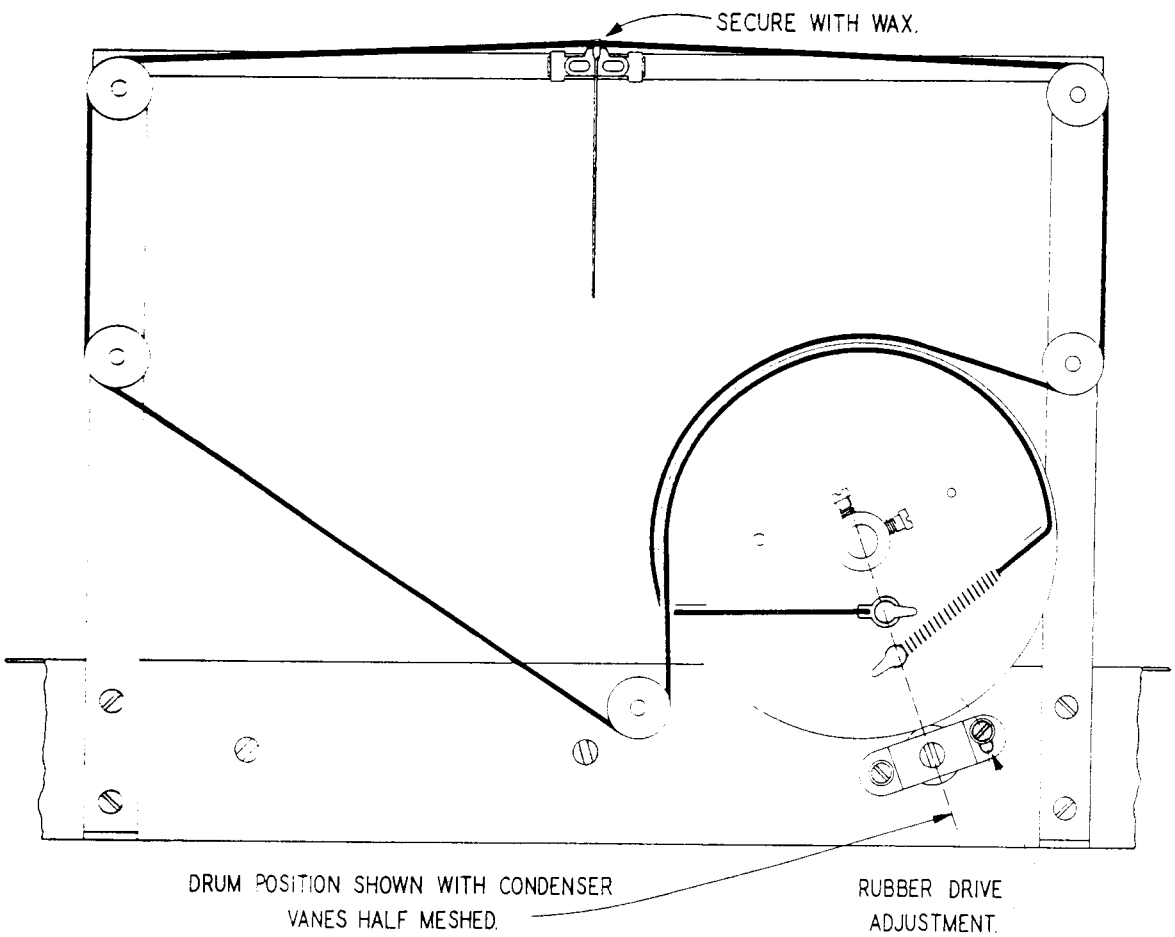
REMOVAL OF PICK-UP

Disconnect pick-up from the tone monitor panel at the rear of the cabinet by unsoldering the two pick-up leads. Unscrew the three wood screws holding the pick-up to the motor board.

REMOVAL OF MOTOR

1. Remove turntable.
2. Unsolder the three motor leads connected to tag panel adjacent to the motor.
3. Remove Speed Arm.
4. Remove the three screws securing motor to the metal bracket on top of the motor board, taking care not to lose the metal spacers.
5. The motor may now be withdrawn from the inside of the cabinet.

NOTE: Before replacing the turntable, set the "Auto-Brake" to "Off" position.



— DIAL CORD ARRANGEMENT & TUNING DRIVE ADJUSTMENT —

RECEIVER ALIGNMENT PROCEDURE

Whenever a component replacement has been made in a tuned I.F. or R.F. circuit, all circuits must be realigned.

I.F. alignment should always precede R.F. alignment, and even if only one coil has been serviced, the whole of the re-alignment should be done in the order given.

To indicate when the circuits are tuned to resonance, an output meter should be connected across the voice coil terminals of the speaker. In carrying out the alignment the signal input to the receiver should be progressively reduced as the circuits are brought into line, so that the output meter reading does not exceed about 1 volt.

I.F. ALIGNMENT

1. Rotate volume control fully clockwise and fully enmesh the tuning condenser vanes. Connect output leads of signal generator to the grid cap of the 6A8G converter valve through a 0.1 mF. condenser—do not remove grid lead to converter valve.
2. Tune signal generator to exactly 457.5 KC.
3. Adjust the I.F. transformer trimmer screws to give maximum reading on output meter, commencing with the second I.F. transformer and following with the first.
4. Continue this alignment carefully on each transformer in turn until no greater output can be obtained. It is necessary to repeat this procedure at least twice to ensure good alignment.

NOTE: If trimmer screws are screwed too far in, it may be possible to obtain a false peak due to coupling effects between the iron cores. Start alignment of each individual transformer by first screwing its cores well out and then advancing core into coil until resonance is obtained.

R.F. ALIGNMENT

1. With controls set as for I.F. alignment, connect signal generator output leads in series with a 200 mmF. condenser to the aerial and earth terminals of the receiver.
2. Check that when the ganged condenser is fully meshed the pointer coincides with the setting line, marked "S", at the extreme left of the dial scale. If necessary, the pointer may be adjusted to this position by softening the wax securing the drive cord to the pointer carrier.
3. Tune signal generator to 600 KC.
4. Rotate tuning knob until pointer is exactly over 600 KC. calibration mark (third mark from the left on upper dial scale) and adjust the oscillator padder screw for maximum response.
5. Rotate tuning knob to 1500 KC. calibration mark (second mark from the right on the upper dial scale) and adjust the oscillator and aerial trimmers in turn for maximum response.
6. Repeat all the foregoing operations for proper alignment.

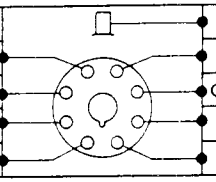
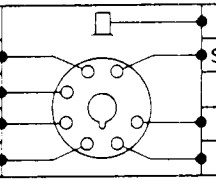
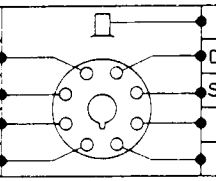
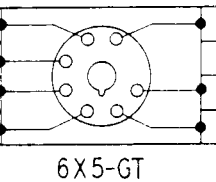
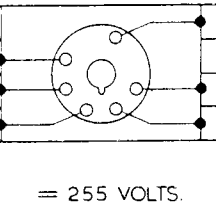
CONVERTER VALVE REPLACEMENT

If the 6A8G converter valve has been replaced, it may be necessary to alter the value of the neutralizing capacitance. This capacitance is in the form of a Nylex insulated wire coiled around the barrel of the aerial trimmer. Its value may be adjusted by altering the length of wire used. The value should be such as to result in approximately equal sensitivity at 600 KC. and 1500 KC. Too much capacitance may result in low sensitivity at the high frequency end of the band, whilst too low a value may give rise to instability.

Complete re-alignment of the oscillator and signal frequency circuits must be carried out if any adjustment of the neutralizing capacitance has been made.

— VOLTAGE TABLE —

- VOLTAGES AND CURRENTS ARE WITH THE RECEIVER OPERATING ON AVERAGE MAINS VOLTAGE, THE RADIO-GRAM SWITCH IN THE RADIO POSITION AND THE RECEIVER TUNED TO A POINT OF NO RECEPTION.
- VOLTAGE READINGS TAKEN WITH METER RESISTANCE OF 1,000 OHMS PER VOLT.
- VOLTAGE AND CURRENT READINGS WITHIN ± 15%.
- RESISTANCE READINGS ARE APPROXIMATE.

VOLTS TO CHASSIS	CURRENT MA.	RESISTANCE TO CHASSIS	VALVE ELECTRODE	VALVE BASE LOOKING AT PINS	VALVE ELECTRODE	VOLTS TO CHASSIS	CURRENT MA.	RESISTANCE TO CHASSIS
			V1	6A8-G	CONVERTER			
					GRID	——	——	2 MEG.Ω
102	4·6	INFIN.	SCREEN GRID		OSC. GRID	——	——	50,000Ω
235	2·7	INFIN.	PLATE		OSC. PLATE	170	3·3	INFIN.
6·3 A.C.	300	——	HEATER		HEATER	NIL	——	NIL
			NO CONN.		CATHODE	2·9	10·6	300 Ω
			V2	6U7-G	I.F. AMPLIFIER			
					GRID	——	——	2 MEG.Ω
102	1·7	INFIN.	SCREEN GRID		SUPPRESSOR	3·3	——	350 Ω
235	8·0	INFIN.	PLATE					
NIL	——	NIL	HEATER		HEATER	6·3 A.C.	300	——
			NO CONN.		CATHODE	3·3	9·7	350 Ω
			V3	6G8-G	A.V.C.-DEMODULATOR-AUDIO			
					GRID	——	——	1 MEG.Ω*
——	——	0·25MEG.Ω	DIODE		DIODE (A.V.C.)	——	——	1 MEG.Ω
50	1·1	INFIN.	PLATE		SCREEN GRID	50	0·3	INFIN.
NIL	——	NIL	HEATER		HEATER	6·3 A.C.	300	——
		2 MEG.Ω	NO CONN.		CATHODE	2·8	1·4	3,000Ω
			V4	6V6-GT	OUTPUT			
235	3·2	INFIN.	SCREEN GRID		GRID	——	——	0·6 MEG.Ω
217	37·6	INFIN.	PLATE					
6·3 A.C.	450	——	HEATER		HEATER	NIL	——	NIL
		0·5 MEG.Ω	NO CONN.		CATHODE	10·0	40·5	250 Ω
			V5	6X5-GT	RECTIFIER			
					PLATE # 1	240 A.C.	——	200 Ω
240 A.C.	——	200 Ω	PLATE # 2					
——	600	INFIN.	HEATER		HEATER	——	——	INFIN.
			NO CONN.		CATHODE	240 A.C.	——	INFIN.

REMARKS:-

UNFILTERED H.T. VOLTAGE = 255 VOLTS.
FILTERED H.T. VOLTAGE = 235 VOLTS.
TOTAL H.T. CURRENT = 62·5 MA.
RECTIFIER HEATER VOLTAGE = 6·3 VOLTS

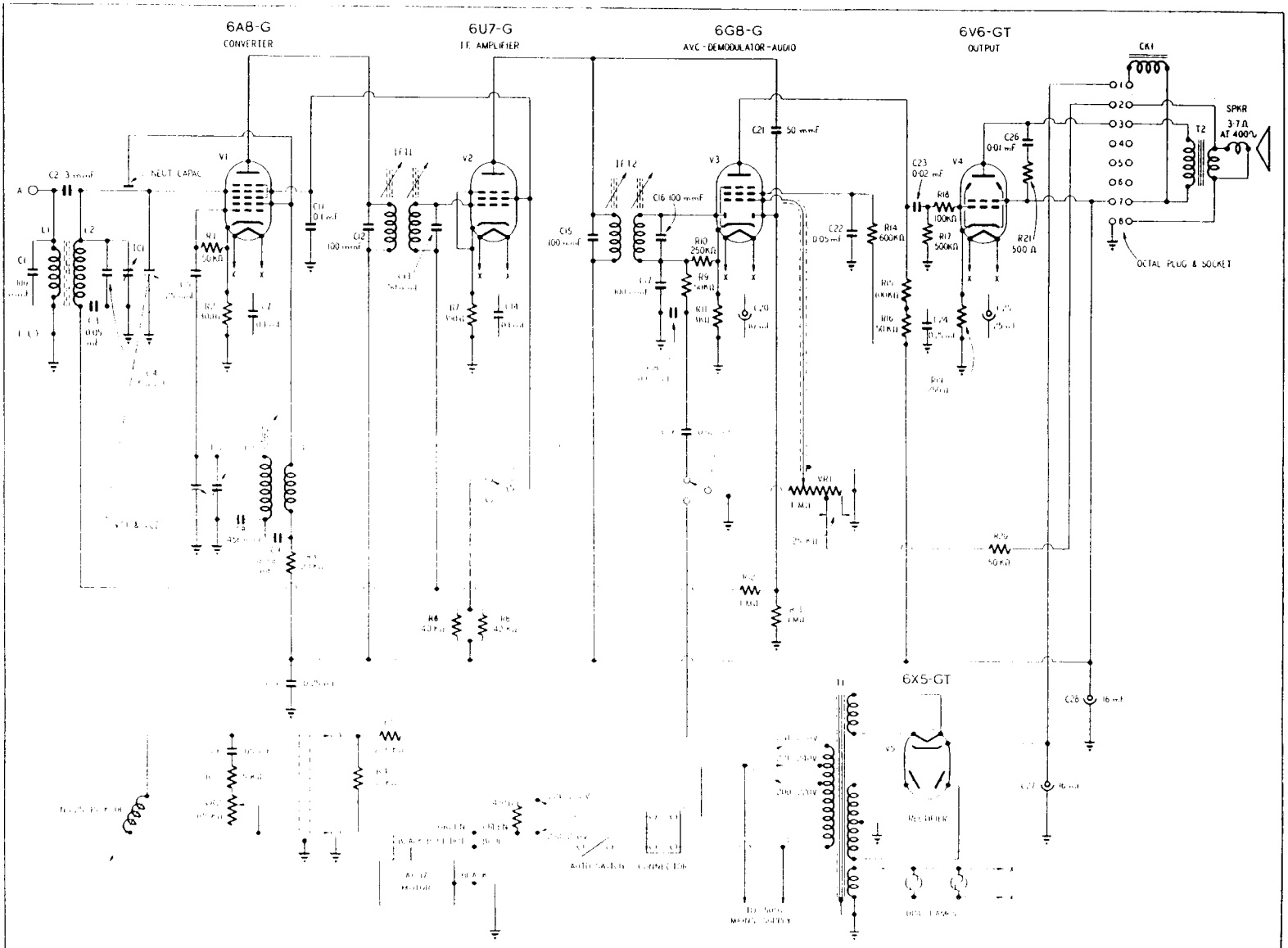
* VOLUME CONTROL FULLY CLOCKWISE.

PARTS LIST

Ref.	Part No.	DESCRIPTION
		RESISTORS
R1	H1X	50,000 ohms ¼ watt ± 10%
R2	IRC.BW ½	300 ohms ½ watt ± 10%
R3	V3X	20,000 ohms 1 watt ± 10%
R4	J1X	100,000 ohms ¼ watt ± 10%
R5	N1X	250,000 ohms ¼ watt ± 10%
R6	S3X	40,000 ohms 1 watt ± 10%
R7	IRC.BW ½	350 ohms ½ watt ± 10%
R8	S3X	40,000 ohms 1 watt ± 10%
R9	H1X	50,000 ohms ¼ watt ± 10%
R10	N1X	250,000 ohms ¼ watt ± 10%
R11	AF1X	3,000 ohms ¼ watt ± 10%
R12	P1X	1 Megohm ¼ watt ± 10%
R13	P1X	1 Megohm ¼ watt ± 10%
R14	BB3X	600,000 ohms 1 watt ± 10%
R15	J3X	100,000 ohms 1 watt ± 10%
R16	H3X	50,000 ohms 1 watt ± 10%
R17	O1X	500,000 ohms ¼ watt ± 10%
R18	J1X	100,000 ohms ¼ watt ± 10%
R19	IRC.BW 1	250 ohms 1 watt ± 10%
R20	H1X	50,000 ohms ¼ watt ± 10%
R21	IRC.BW ½	500 ohms ½ watt ± 10%
R22	V2X	5,000 ohms ½ watt ± 10%

Ref.	Part No.	DESCRIPTION
		CONDENSERS
C1	D0243P	100 mmF. ± 10%
C2	D0243BU	3 mmF. ± .5 mmF.
C3	C0013M	0.05 mF. 200V. wkg.
C4	D4405D	5 mmF. ± 10%
C5	D0243BE	25 mmF. ± 10%
C6	C0013M	0.05 mF. 200V. wkg.
C7	C0013Q	0.1 mF. 200V. wkg.
C8	D0243CR	456 mmF. ± 5 mmF.
C9	D0243K	0.001 mF. ± 10%
C10	C0013C	0.25 mF. 400V. wkg.
C11	C0013E	0.1 mF. 400V. wkg.
C12	D4405W	100 mmF. ± 5%
C13	D4405X	50 mmF. ± 5%
C14	C0013Q	0.1 mF. 200V. wkg.
C15	D4405W	100 mmF. ± 5%
C16	D4405W	100 mmF. ± 5%
C17	D0243P	100 mmF. ± 10%
C18	D0243P	100 mmF. ± 10%
C19	C0013I	0.02 mF. 400V. wkg.
C20	C0014S	10 mF. 40 P.V.
C21	D0243Q	50 mmF. ± 10%
C22	C0013G	0.05 mF. 400V. wkg.
C23	C0013I	0.02 mF. 400V. wkg.
C24	C0013C	0.25 mF. 400V. wkg.
C25	C0014CC	25 mF. 40 P.V.
C26	C0013N	0.01 mF. 600V. wkg.
C27	C0014BA	16 mF. 350 P.V.
C28	C0014BA	16 mF. 350 P.V.

Ref.	Part No.	DESCRIPTION
		MISCELLANEOUS
VC1 and VC2	D1993	2 Gang Condenser
VR1	D1944A	1 Megohm Potentiometer tapped at 25,000 ohms.
VR2	D1417A	100,000 ohms. Potentiometer
S1	D2268	2 Pole 2 Position Switch
I.F.T.1	D1985	1st I.F. Transformer
I.F.T.2	D2238	2nd I.F. Transformer
T1	D2239	Mains Transformer
T2	D2236	Output Transformer
CK1	D2237	H.T. Filter Choke
L1 and L2	D1614E	B/C Aerial Coil
L3 and L4	D2224	B/C Oscillator Coil
TC1	D0786A	Trimmer Condenser (1.5 — 12.0 mmF.)
TC2	D2383	Trimmer Condenser (3 — 30 mmF.)
Spkr.	C0342	6in. Permag. Speaker
	28060T	Pick-Up (No. 25)
	21902G	Motor (AC37)
	D2269	Dial Glass
	D1536A	Rubber Drive Bush
	D2011B	Dial Pointer
	D2229B	Dial Cord
	D0873	Cord Spring
	D2009	Knob
	D1571	"Tone" Knob



CIRCUIT DIAGRAM OF MODEL 112 INCORPORATING CHASSIS TYPE A536 BS/RG).

GRAMOPHONE MOTOR OPERATION

READ CAREFULLY IN CONJUNCTION WITH FIG. 1 BEFORE ATTEMPTING ADJUSTMENTS.

MOTOR STARTING

Lift the pick-up head and move it away from the turntable until a click is heard. This movement causes the pick-up lever, L1, to act on the outer arm of the forked lever, L2, which in turn operates the motor switch through levers L4 and L5. Whilst the motor is running the hand brake lever, HB, is held in the "Off" position by lever L5.

THE AUTOMATIC BRAKE

The pick-up arm travels across the record until the point is reached when lever L1 slowly commences to push lever L2 (rubber covered arm). This slight movement is transmitted to the brake lever L3 by the friction caused by Isle-o'-Man washer F. Note the correct position of pick-up arm lever L1 in the fork of lever L2. As long as the needle progresses over the record at the normal rate (obtained only by the actual playing of a record), the movement of the pick-up arm is not enough to move L3 sufficiently for the face B to engage with tooth C on the frictional collar around the turntable bush. The cam D contacts the rubber ring A, thus pushing the lever L3 away at each revolution.

When, however, the end of the record is reached and the spiral "run in" groove gives the pick-up arm rapid movement, the increase in speed of movement is sufficient to cause the end of the lever L3 to move far enough towards the turntable spindle for the tooth C to strike the face B, thus actuating the brake and operating the motor switch.

ADJUSTMENT OF BRAKE

If a any time the spring SP1 on the hand brake is renewed or replaced, make sure that the axis of the spring lies as far distant as possible from the centre of the pivot of the HB lever, otherwise the friction brake may fail to operate in conjunction with the automatic stop. If auto brake does not function, remove the spring clip E and Isle-o'-Man washer F. Bend the three arms of the Isle-o'-Man washer to give increased tension and replace. This will give increased friction at the bearing.

Too much friction may cause a hollow knocking sound to be transmitted to the pick-up, and may also cause undue record wear. If a knocking sound is heard from speaker, slightly decrease the friction at F, but do NOT apply oil.

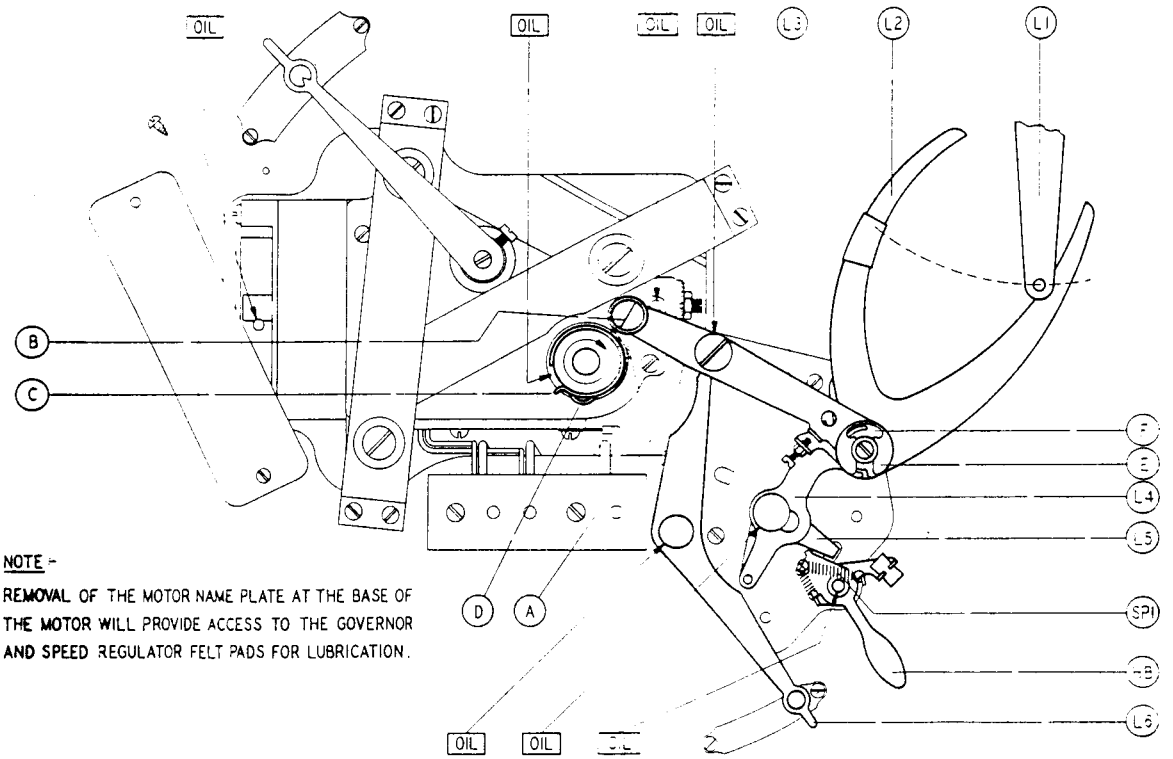
MOTOR LUBRICATION

It is important that only good quality light machine oil and grease, free from acid, should be lsed for lubrication. It is advisable to lubricate the motor regularly, depending on how much it is used; refer to Fig. 1 for oiling points.

ADDITIONAL DATA

Any further service information desired may be obtained by addressing an inquiry to The Service Department, The Gramophone Co. Ltd., 2 Parramatta Road, Homebush, N.S.W.

(The Company reserves the right to make any modification without notice).



NOTE -

REMOVAL OF THE MOTOR NAME PLATE AT THE BASE OF THE MOTOR WILL PROVIDE ACCESS TO THE GOVERNOR AND SPEED REGULATOR FELT PADS FOR LUBRICATION.

— FIG. 1. —